

September 2003



Northwest Area Transportation Study

FINAL REPORT

Executive Summary

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Final Report EXECUTIVE SUMMARY

prepared for



prepared by



September 2003

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1. Study Purpose and Background

As the designated Metropolitan Planning Organization or MPO for the Maricopa region, the Maricopa Association of Governments (MAG) is developing a new Regional Transportation Plan (RTP). As part of the RTP development process, and at the request of local jurisdictions, MAG initiated three sub-area transportation studies¹ to provide background information and input to the RTP. This area study focuses on the Northwest portion of the region.

Related to this study, MAG also initiated a separate study for regional high capacity transit (HCT). Valley Metro similarly initiated a Regional Transit System (RTS) Study. Findings from these two transit studies conducted in parallel formed the basis for recommendations for transit in this study. More information on the transit and other background studies for the RTP may be found on the MAG Web page, located at www.mag.maricopa.gov.

The goal of the MAG Northwest Area Transportation Study (NWATS) is to identify transportation needs within the study area and develop a prioritized list of major transportation projects to address those needs. The highest ranked projects from that list will subsequently be assessed against competing regional projects as part of the RTP process, where the highest ranked projects will be selected for possible regional funding. In addition to identifying major projects for potential regional funding, this

area study will provide a general long range framework to prioritize and guide transportation development in the northwest

1.1 Study Area

As shown in Figure 1, the study area is bounded by I-17 on the east, I-10 on the south, and the county lines on the west and north. While the study covered the entire area, the focus for recommendations is the developed or developing area, which generally lies east of the CANAMEX Corridor.

The study area includes El Mirage, Glendale, Litchfield Park, Peoria, Surprise, Wickenburg, and Youngtown. Additionally, portions of Avondale, Buckeye, Goodyear, Phoenix and Tolleson as well as unincorporated portions of Maricopa County are located within the study area.

1.2 Study Process

The study was structured into separate tasks and produced the following working papers:

Working Paper #1: Review of Previous Studies

Working Paper #2: Socioeconomic Conditions

Working Paper #3: Transportation Data

Working Paper #4: Transportation Issues

Working Paper #5: Evaluation of Alternatives

Working Paper #6: Recommendations

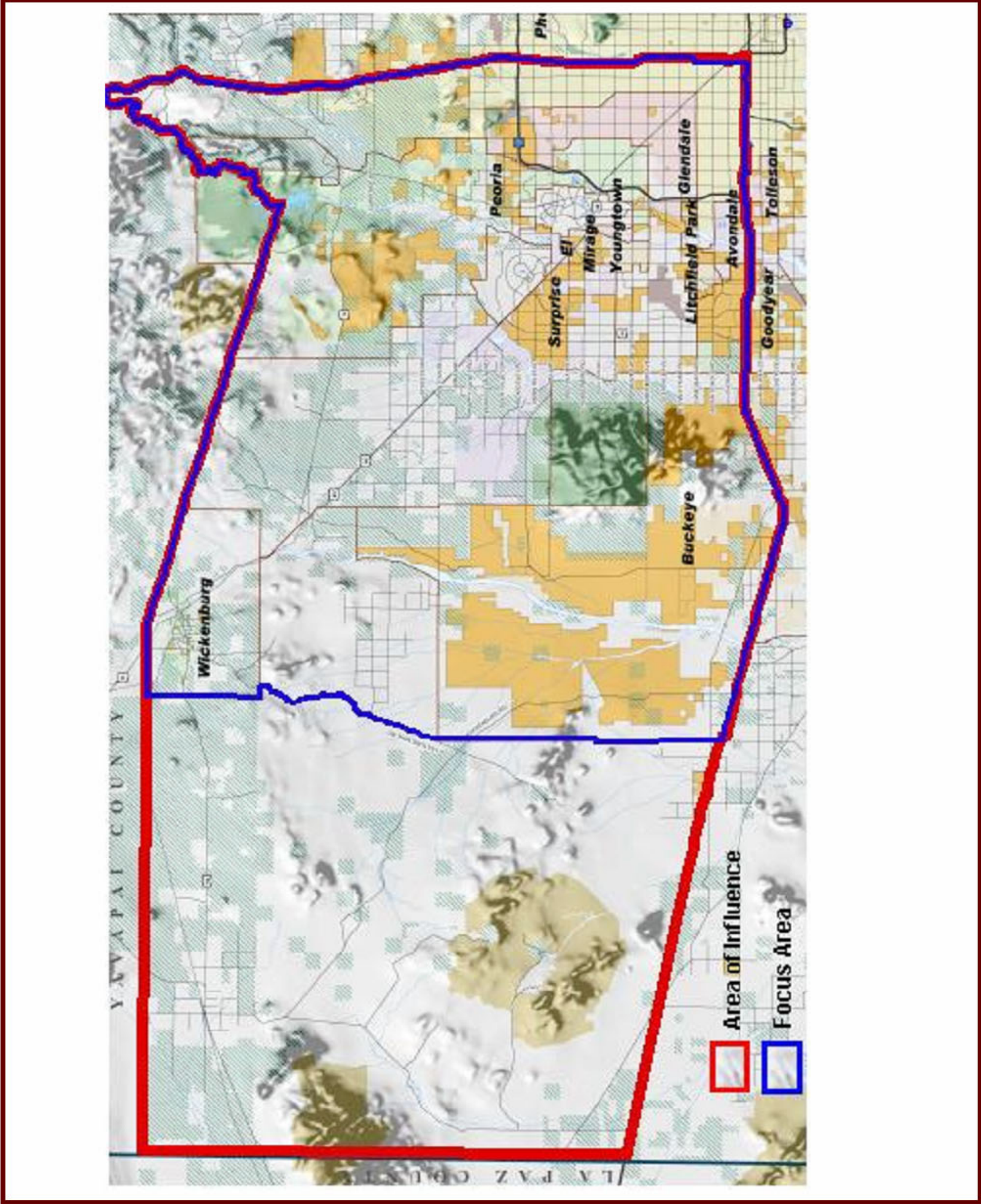
The Final Report and this Executive Summary are based upon the Working Papers and feedback on the papers received in consultation with the public, stakeholders and agencies, which occurred throughout the study process. The first three papers

¹ Area studies for the southwest and southeast were also conducted. Separate area studies for central Phoenix and the northeast were declined by the local jurisdictions, which had already completed studies or otherwise wished to provide input to the RTP process directly.

document key results from previous related studies as well as available information on growth and transportation in the northwest. Working Paper #4 documents transportation issues identified through the consultation process as well as technical analyses conducted for this study. Working Paper #5 presents alternative scenarios designed to

address the identified transportation issues and assesses the scenarios against standard evaluation criteria. Finally, considering the assessment of alternatives and feedback received in consultation, recommendations for transportation improvements in the Northwest area are developed.

Figure 1: Study Area



Northwest Area Transportation Study

STUDY AREA



MARICOPA
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DECEMBER 2003

2. Consultation Process

The consultation process was designed with the following goals in mind:

1. Inform, educate, and engage people/agencies early and continuously throughout the planning process.
2. Provide opportunities for early and continuing public participation in the decision-making process and encourage participation.
3. Respond to participant issues and concerns clearly and understandably.
4. Obtain input from a broad range of citizenry by using a variety of techniques.
5. Review participant comments and integrate them into transportation plans as appropriate.
6. Maintain consistency with MAG's RTP consultation process, the ongoing general MAG public involvement process, and any relevant local jurisdictional public involvement/consultation processes.

Stakeholders were categorized into target audiences based on commonality of interests,

use of existing organized groups, geographic location, and/or existing official structure.

The consultation included:

- Elected Officials
- Agency Stakeholders
 - Representatives from the participating cities
 - Representatives from other interested jurisdictions and agencies
- Community Stakeholders / General Public
 - Neighborhood Groups
 - Businesses
 - Professional Organizations
 - Civic Organizations / Local Advisory Groups
 - Individuals

2.1 Consultation Program Activities

Consultation activities were closely linked and integrated with study milestones. Each activity was specifically designed to meet one or more of the consultation program goals. See Table 1 on the next page.

Table 1: Activities/Goals Matrix

Consultation Activities	Consultation Program Goals					
	Goal 1: Inform, Educate, Engage	Goal 2: Provide Opportunities	Goal 3: Develop Accountability, Credibility, Accessibility	Goal 4: Reach Broad Range	Goal 5: Consider and Incorporate Comments	Goal 6: Maintain Consistency with other Public Involvement Processes
Newsletters	●			●		●
Summary Reports			●		●	
Public Open House Meetings	●	●	●	●		●
Stakeholder Interviews	●	●	●			●
Agency Forum Workshops	●	●	●			●
Displays	●	●	●	●		
Website	●	●	●	●		●
Study Tour	●	●	●			

2.2 Summary of Consultation Activities

Forums and workshops were held throughout the study (see Table 2). Agency Forums and Workshops were an important part of the study as they provided opportunities for the participating agencies to meet in a small to mid-size group and discuss in detail the various transportation issues, draft documents and results from the study. Four Agency Forum Workshops were conducted. Non-agency stakeholders and the public also attended these meetings.

Two public open house meetings were conducted, providing additional opportunities for all stakeholders and the general public to obtain information about the study and provide input.

Additionally, interviews with representatives of individual agencies and stakeholder groups were conducted. Representatives

typically included planning staff, town/city managers, and department heads. Each interviewee completed a survey soliciting input on existing conditions and opinions on transportation improvement priorities. The results of those surveys were considered in the final recommendations. Interviewees included:

- Town of Buckeye
- City of El Mirage
- City of Peoria
- City of Phoenix
- City of Surprise
- Town of Youngtown
- Town of Wickenburg
- Regional Public Transportation Authority
- Sun City Grand Homeowners Association
- Sun City Property Owners and Residents Association (PORA)
- Westmarc
- Bureau of Land Management

Interviews were also offered to Mayors of participating jurisdictions. Interviews were conducted with:

- Mayor Joan Shafer, Surprise
- Mayor Lon McDermott, Wickenburg
- Mayor Dusty Hull, Buckeye
- Mayor John Keegan, Peoria, and
- Mayor Roy Delgado, El Mirage

Table 2: Consultation Events for the MAG NW Area Transportation Study

Agency Kick-off Meeting	Tuesday, November 13, 2001 Surprise City Hall 12425 West Bell Road, Surprise
Study Area Tour – Elected Officials	Wednesday, May 1, 2002 12:00 noon – 3:00 p.m.
Agency Forum	Monday, July 1, 2002 1:30 p.m. Glendale Main Library, Large Meeting Room 5959 W. Brown Street, Glendale
Open House and Public Meeting	Tuesday, September 17, 2002 6:30 – 8:30 p.m. Glendale Community College Student Lounge, Glendale
Agency Forum	Monday, December 9, 2002 1:30 p.m. Peoria City Hall, 8401 West Monroe, Pine Room, Peoria
MAG Transportation Review Committee Presentation	Thursday, January 30, 2003 MAG, 301 N. 1 st Avenue, Saguaro Room, Phoenix
Agency Forum	Wednesday, February 19, 2003 10:00 a.m. Glendale Civic Center – Boardroom 5750 W. Glenn Drive, Glendale 85301
Agency Forum	Tuesday, April 29, 2003 10:00 a.m. City of Surprise Council Chambers 12425 West Bell Road, Surprise
Open House and Public Meeting	Tuesday, April 29, 2003 5:00 – 7:00 p.m. Alta Loma Elementary School 9750 N. 87th Avenue, Peoria

3. Socioeconomic Overview

Socioeconomic data from the MAG RTP update were used for this study, with assigned horizon years of 2020 and 2030. As is typical for long-range forecasts, actual population and employment may reach these forecast levels a few years earlier or later than assumed in the forecasts. The study therefore focuses on the transportation system and services needed to support the projected future levels of population and employment in the northwest, and not on the precise years in which those levels may be reached.

Currently, population densities in the southeastern sector of the study area, closest to the center of the urbanized area, are as high as 5,000 persons per square mile. These densities generally decrease to the north and the west. Higher densities follow the Grand Avenue corridor to Sun City and parts of Surprise where development patterns in the retirement communities are relatively compact. Still, most of the acreage in the study area is only sparsely populated. Some of the low-density areas will remain so because of protected status as parks and/or

environmental preserves, but large tracts of land remain available for development to the north and west of current urban densities.

Many of the Northwest Valley communities have vast incorporated areas that have been zoned for generally low density residential, but there are pockets of intensity around future employment or government centers that will be defining hubs for the transportation system.

Employment shows a pattern similar to that of population, with higher densities in the southeastern portion of the study area. Newer employment nodes have begun to appear farther out along major transportation corridors, putting pressure on these facilities. These facilities will continue to become more congested as employment spreads further away from the urban center. See Tables 3 and 4 on the following page.

As the RTP is further refined, socio-economic information could also change before the final adoption of the data.

Table 3: Population within the Study Area

MPA	2000 Population	2020		2030	
		Population	Increase Over 2000	Population	Increase Over 2000
Avondale	19,145	37,231	94%	37,325	95%
Buckeye	2,954	59,570	1,917%	201,309	6,715%
County	65,738	82,209	25%	118,201	80%
El Mirage	8,723	44,696	412%	51,186	487%
Glendale	230,286	308,854	34%	311,693	35%
Goodyear	8,868	33,136	274%	40,892	361%
Litchfield Park	3,831	14,095	268%	14,573	280%
Peoria	114,142	250,391	119%	349,639	206%
Phoenix	414,549	547,697	32%	590,357	42%
Surprise	37,746	210,629	458%	345,510	815%
Wickenburg	7,419	9,956	34%	18,766	153%
Youngtown	3,013	6,395	112%	7,170	138%
Total Study Area	916,414	1,604,859	75%	2,086,621	128%
Total Region	3,135,944	5,525,548	69%	6,815,583	103%

Note: Does not include seasonal or transient population.

Table 4: Employment within the Study Area

MPA	2000 Employment	2020		2030	
		Employment	Increase Over 2000	Employment	Increase Over 2000
Avondale	3,236	18,587	474%	23,944	640%
Buckeye	538	19,432	3,512%	63,168	11,641%
County	20,546	27,578	34%	38,682	88%
El Mirage	1,885	17,701	839%	24,904	1221%
Glendale	84,542	160,344	90%	192,053	127%
Goodyear	6,299	29,002	360%	41,818	564%
Litchfield Park	1,178	5,059	329%	4,703	299%
Peoria	28,359	98,114	246%	153,098	440%
Phoenix	111,757	178,519	60%	247,680	122%
Surprise	8,999	55,310	515%	123,181	1,269%
Wickenburg	4,052	6,304	56%	12,214	201%
Youngtown	1,224	1,655	35%	1,713	40%
Total Study Area	272,615	617,605	127%	927,158	240%
Total Region	1,640,297	2,918,881	80%	3,668,663	123%

4. Transportation Data

4.1 Existing Conditions

The Northwest Valley is served by a partial grid roadway system that connects the major activity centers with a hierarchy of roadways ranging from local streets in neighborhoods to limited access freeways for interregional travel. The concept of the street network's grid roadway system is a series of north/south and east/west arterial roadways, which provide access to adjacent land uses, generally consistent traffic signal control, and a significant level of regional movement. Though not complete, much of the existing street system layout is either in place or planned according to a grid concept.

The main exception to the grid layout is Grand Avenue, one of the area's original roadways, which runs northwest/southeast through the Valley. Grand Avenue is U.S. 60 and the major surface roadway in the Northwest Valley. It provides a high level of access to area uses that have evolved along the roadway, but it also disrupts the grid traffic pattern. Among the impacts of Grand Avenue are the creation of complex six-legged intersections and truncation of local streets that reroute local traffic onto the arterial system for even very short trips. Current (2001) lane configurations are illustrated in Figure 2 on page 11.

4.1.1 Existing Traffic Volumes and Congestion

Traffic count data are essential to the management of the local street system. This is true for local needs as well as regional objectives. Traffic volumes are not only an indication of demand, but can also show developing trouble spots and help shape strategic plans for improvements. In

the Northwest Valley, not all communities collect traffic volumes on a regular basis. Phoenix, Glendale and Peoria have well-established data gathering practices, but other cities are still developing their controls. For those communities, the latest information is obtained from MAG, the County or ADOT, but is not collected as frequently as required to manage a growing system effectively. Figure 3 on page 12 shows 2001 Average Daily Traffic.

4.1.2 Traffic Signalization / Intelligent Transportation Systems

The signal systems and coordination in the Northwest Valley are operated independently by each city. With the exception of Phoenix and Glendale, there are no central signal control systems in the area, which limits the opportunities for area wide implementation of signal coordination in the near future. Consistent with the MAG ITS Strategic Plan, both Phoenix and Glendale are part of the regional program to encourage signal coordination across jurisdictional boundaries. They have the ability to provide information to a regional traffic operations center that could be shared with other cities and the State for incident identification/response and the prospect of interjurisdictional coordination of signals.

4.2 Future Highway System Characteristics

Based on the anticipated changes in the General Plans of the NWATS communities and other transportation agencies such as ADOT and Maricopa County, the highway system will grow substantially over the next 20 or so years. While some improvements are to be made in the already urbanized

area (e.g., Glendale and Phoenix programs), most of the changes can be expected to take place in the outlying growth areas of each city. Peoria, Surprise and Buckeye in particular have ambitious plans to expand roadways into new areas as development activity moves north and west.

4.3 Transit System

Despite local and regional policies that support a multimodal approach, given current corridor level population or employment densities, transit has not been a competitive transportation option in the Northwest Valley. However, there is a growing interest in providing alternatives.

The study of high capacity transit is currently underway to identify where such service might offer the potential of improved mobility in the region. Commuter rail is of interest in many of the communities that abut the BNSF Railroad right-of-way because the corridor is already well defined. Light rail transit (LRT) is under development in Phoenix and will be evaluated soon in Glendale. Bus rapid transit (BRT) is another technology that is being developed in the City of Phoenix, but which may offer opportunities throughout the Northwest Valley (and the entire region) for line haul transit service. Figure 4 on page 13 shows transit service in operation in 2001.

4.4 Bicycle/Multi-Use System

While most communities within the Northwest Valley have included bicycle and multi-use path elements within their master plans, most efforts related to these elements are focused around recreation or as an element of roadway development

rather than as a separate system. Figure 5 on page 14 reflects bikeway and multi-use facilities as of 2001.

4.5 Goods Movement / Intermodal Operations

The section of I-10 leading west from Central Phoenix is home to multiple distribution centers. These operations rely prominently on trucks for collection and distribution of goods throughout the Valley and to other regions in the southwest and the nation. While there is no designated truck route system in most of the Northwest Valley, most truck traffic uses the existing freeway system (i.e., I-10, I-17, Loop 101) or Grand Avenue for their activities. There is measurable growth in the use of existing Loop 303 for goods movement even before it is upgraded.

The Burlington Northern-Santa Fe Railroad (BNSF) mainline is adjacent and parallel to Grand Avenue in the Northwest Valley. The line carries about eight trains each day and serves a number of longstanding customers of the railroad along Grand Avenue. The Grand Avenue route is critical to BNSF operations, but the railroad is willing to discuss freight schedule adjustments to allow a broader use of the corridor (e.g., commuter rail) as well as expedite freight activities through the area. This would reduce the demand for the use of the track in freight operation, and the conflict with passenger service. It would also simplify discussions about sharing. Some of the key facilities such as the automobile loading/unloading yard near Thunderbird Road in El Mirage would need to be considered in plans for a relocation of mainline services.

Figure 2: 2001 Number of Lanes

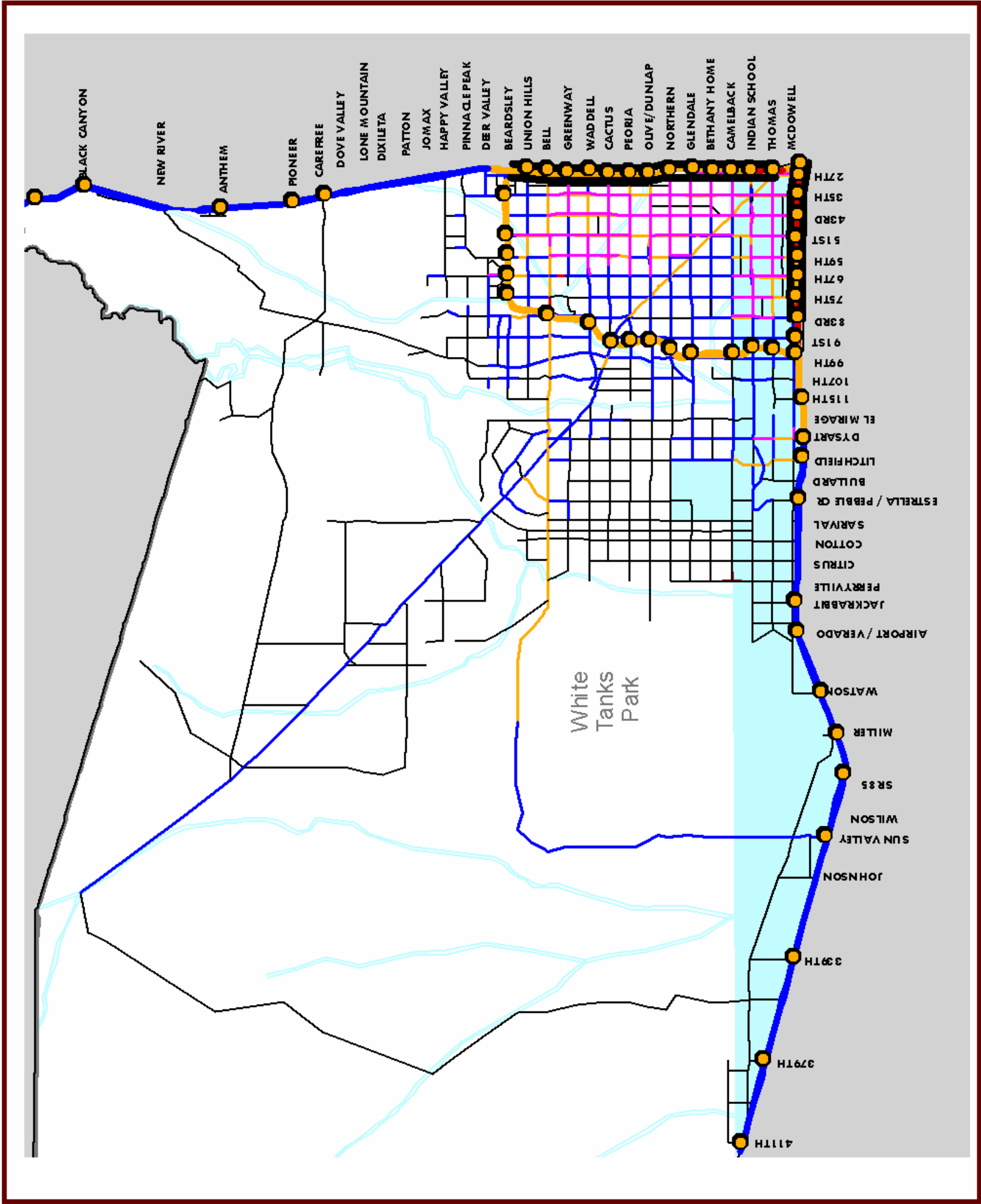


Figure 3: 2001 Average Traffic Volume

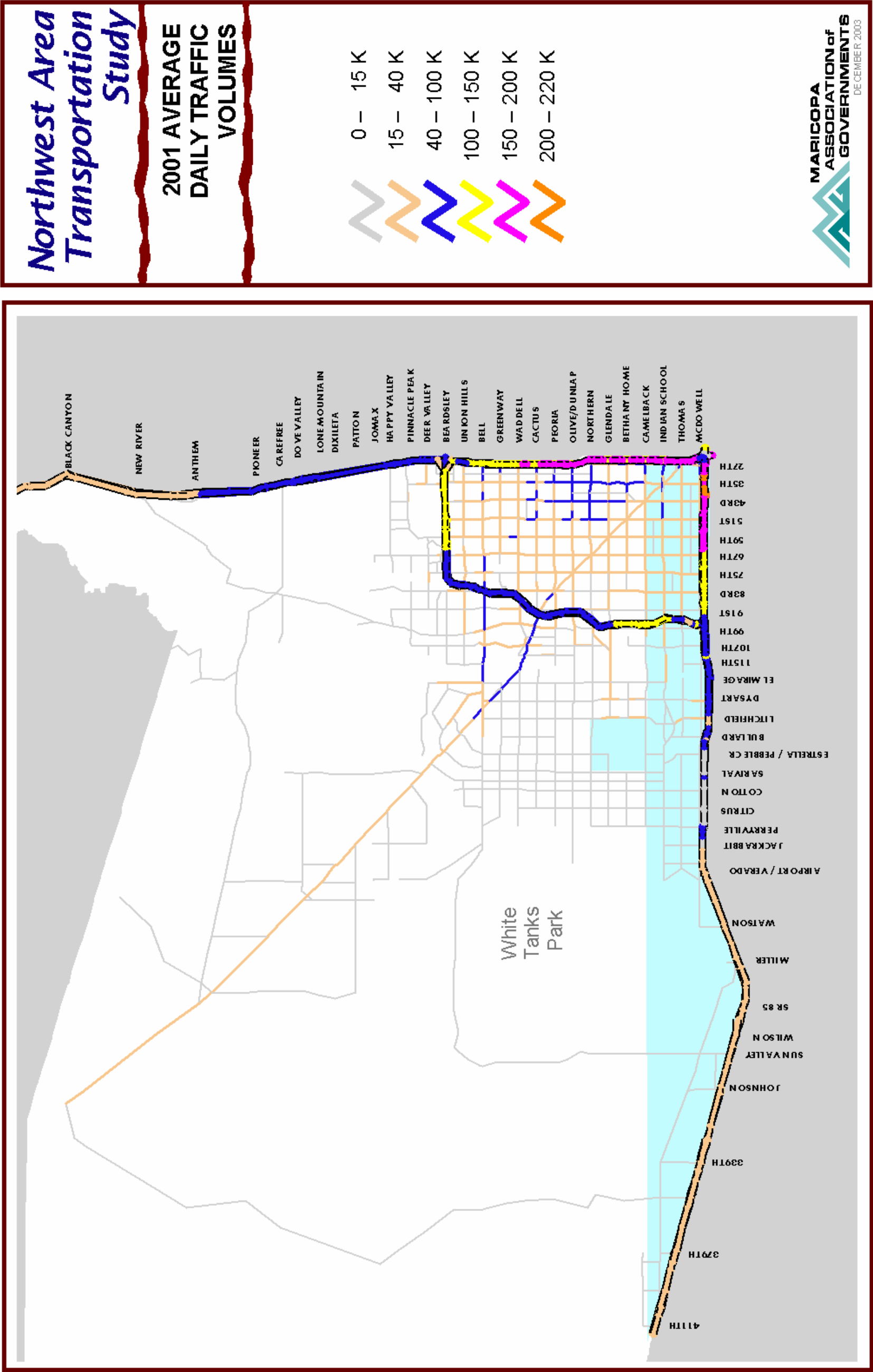


Figure 4: 2001 Existing Transit Service

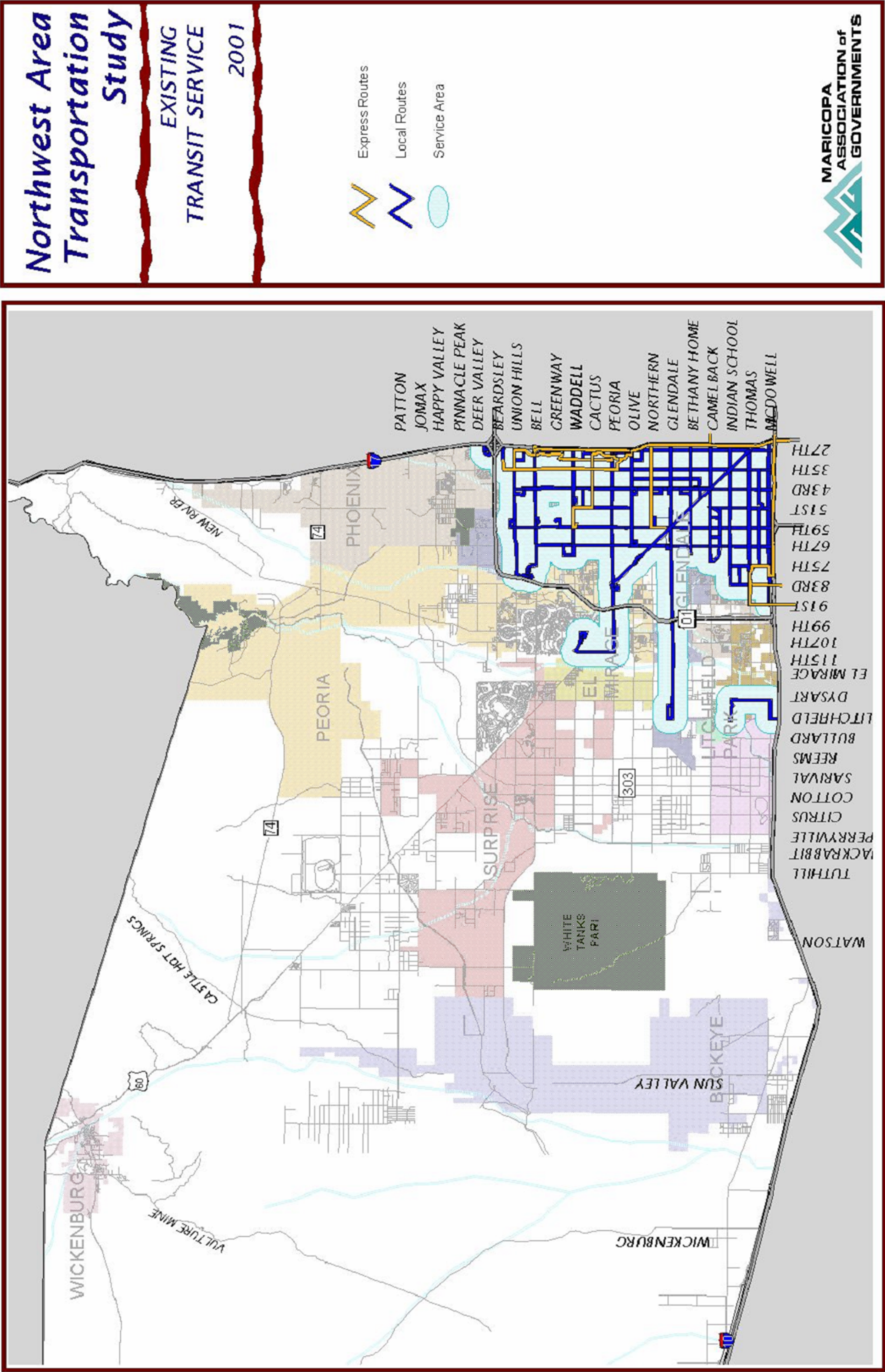
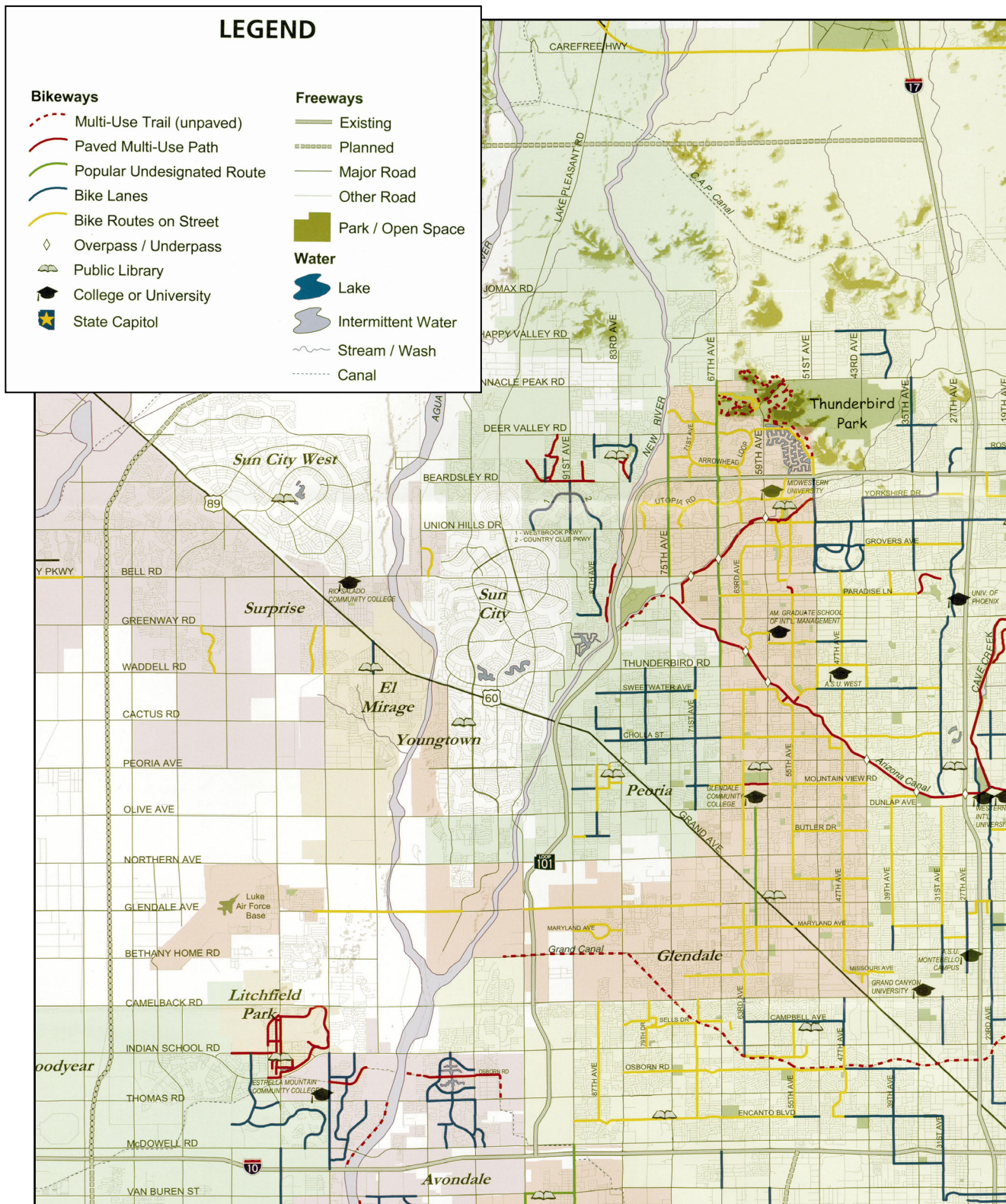


Figure 5: Existing Bicycle and Multi-Use Facilities



Source: Bikeways Metropolitan Phoenix Area, Maricopa Association of Governments, 2003

5. Transportation Issues

Through consultation with the public, agency and private stakeholders, review of previous studies in the area and technical analyses, key transportation issues were identified in the Northwest Valley. Many are longstanding concerns and continue to surface in studies performed at the regional and local levels. Others are less visible, but just as significant as they relate to the long-term viability of the overall system. Based on discussions with the local communities and interests, the following issues appeared most frequently.

- Elderly Mobility
- Funding Transit Expansion
- Luke Air Force Base (AFB)
- Existing and New Freeway Capacity/Access

- Freeway Funding
- Upgrade Railroad Crossings
- Right-of-way (ROW) Preservation in Transportation Corridors
- Signal Coordination / Intelligent Transportation Systems (ITS)

5.1 Issues by Mode

The listing combines the results of the consultation process with the technical analyses completed in earlier tasks to identify the issues that appear to pose the most significant challenges in the Northwest Valley. Table 5 shows which issues are most important within each mode. It also includes a policy category.

Table 5: Issues by Mode

	Arterial Highway	Freeway	Transit	Bikes / Ped. / Alt. Modes	Policy
Common Access Control Policy	X				X
Arterial Grid Completion	X				
Improvement to Freeway Interchanges	X	X	X		
Railroad Crossing Upgrades	X		X		
ROW Preservation	X	X	X	X	X
River Crossings (new and expanded)	X				
Signal Coordination/ITS	X				
HOV* Lanes on Freeways			X		
Freeway Capacity Improvements		X			
Funding	X	X	X	X	X
Elderly Mobility			X	X	X
Non-motorized Access			X	X	
Policies for Pedestrians				X	X

* HOV = High Occupancy Vehicle

5.1.1 Discontinuities in the Street Network

A major challenge to providing reliable roadway transportation is the discontinuity and the irregularity of portions of the arterial grid. Section line roadways are often interrupted by natural land formations, major developments or other installations that have been in place since long before the growth of the past 20 or so years. Where this occurs, parallel arterials are forced to carry higher loads and distort the balance within the network. This results in congestion and impacts to access and adjacent land uses.

5.1.2 Variable Width Roadways

As the primary regional transportation network, the arterial roadway system crosses municipal boundaries and is therefore subject to the planning efforts of multiple localities. A particular problem arises with roadways constructed in unincorporated areas by the County that do not meet municipal standards or needs. Variable roadway conditions also result from constructing roadway segments at different times and for different purposes. This has resulted in a network of shifting capacities and a “scaloped streets” challenge. Depending on arterial and location, roadways can increase and decrease in capacity over relatively short distances. The scaloped streets problem creates congestion where street cross-sections narrow. They also create a burden to other streets that compensate for substandard capacities in narrow or unfinished sections. In practical terms, varying roadway capacities result in reduced levels of service and decreased effectiveness for vehicular flows.

5.1.3 Capacity Limitations

Based on current volumes, the locations that experience recurring congestion are concentrated around the Grand Avenue

Corridor, and I-17. During the peak periods of the day, they can reach level-of-service (LOS) E or F (see discussion of LOS in section 6) causing serious delays. The complexity of some intersections and the “shortcut” effect of the diagonal alignment of Grand Avenue through the Northwest Valley and the heavy concentration of land uses along the I-17 Corridor contribute to these being the most congested routes in the area. As a result, many of the intersecting arterials also suffer from over capacity conditions as they accept diverted traffic or feed the key roadways. In general, however, congestion is not widespread as yet in the Northwest Valley, though growth projections would indicate major improvements will be needed to maintain adequate traffic flow as the area develops.

One of the primary concerns is the provision of sufficient capacity in the highway network to accommodate the expected growth. Loop 303, for example, though not yet funded, is being fully relied on by development for future transportation needs. ADOT expects that I-10 and I-17 will require substantially more capacity within the next 20 years to handle planned growth. Similar issues arise with key arterials such as Bell Road. Part of providing the needed capacity is to integrate the transportation plans of the growing communities so that they work in a cohesive fashion. This may require review of timing and funding to ensure that unnecessary congestion “hotspots” are not created as growth occurs.

5.2 Safety

On average, Arizona has a higher crash rate than the nation as a whole. In 2002, the U.S nationwide accident rate was 1.51 per 100 million vehicle miles of travel. Arizona's rate was 2.09 for the same period. In 2002, there were a total of 9,543 crashes in the

Northwest Valley, or 11% of the total of 87,606 crashes for the County. This compares to a population in the Northwest Valley that was 28% of the total for the County in 2000. One possible explanation for the lower number of accidents in the Northwest Valley compared to the County is that there is less overall travel per resident in the Northwest Valley relative to Phoenix and the rest of the region. The construction of additional freeway mileage and the expansion of ITS improvements should help minimize the number of crashes in the Northwest Valley in the future, as some of the traffic that otherwise would travel on arterials will move to the new and improved freeways that provide relatively higher levels of safety.

5.3 Elderly Mobility

While many issues are heavily focused on short-term challenges, the frequent showings by “elderly mobility” and “right-of-way preservation” are two important exceptions. They reflect the aging of the population (and the elderly population already in the area)

and the need to plan the system to accommodate their needs in roadway design (e.g., more visible signage, better lighting, wider striping, etc.) as well as the provision of alternative modes of travel. The results also point to the need to avoid of right-of-way problems to provide for ever-expanding capacity needs as the area continues to develop.

5.4 Bicycle/Pedestrian Discontinuities

The nature of the issue of integrating a system of bicycle paths and pedestrian amenities across jurisdictional lines rises as discontinuities multiply. The same factors that limit the effectiveness of the arterial grid also limit the development of a separate feasible regional bike lane or bike route system to aid commuters.

5.5 Aviation

Aviation is addressed in the MAG Regional Aviation System Plan.

6. Evaluation of Alternative Packages

Four packages were defined for model testing. Each was formulated to address specific components of the future plan and allow a comparison of key facilities or capital programs against other facilities or programs. The final or recommended set of projects for the northwest is a combination of the best performing projects from these packages. The modeling packages are defined as follows:

1. **Base Year** – This package reflects conditions on a current (2002) roadway network with 2000 socio-economic data and identifies a starting point for existing

trouble spots and the potential for future system limitations as growth continues.

2. **Future Base** (Long Range Transportation Plan or LRTP-Based Reference Scenario) – This package includes the current LRTP system (with one principal exception) updated to include additional arterial improvements as contemplated by individual communities in their General Plans as well as a logical buildout of the arterial network. All LRTP-specified freeway enhancements are included in this package with the major exception of widening of I-17 between Dunlap Avenue

and I-10. Widening of I-17 is considered a major cost item for which feasibility is not certain, so it is treated as an option in the “New Corridors” package. Widenings to existing freeways to their ultimate build-out are treated as options in the “Enhanced Corridors” package. Transit facility and service improvements as specified in the current LRTP are included in this modeling package (i.e., a tripling of local bus service, tripling of dial-a-ride service, quadrupling express bus service, and completing a 39-mile light rail system. It also included BRT as well as local circulators for the express bus network and light rail system. A regionwide system of more than 20 public park-and-ride lots was also part of the 2002 LRTP).

3. **Enhanced Corridors** – Building on the LRTP-Reference or “Future Base” Network, this package includes specific improvements to existing freeways and adding general purpose or HOV lanes to address congested segments. Widenings to existing freeways were generally constrained by right of way or infrastructure limits. Upgrading of rural facilities to partially controlled access facilities based on feedback from local communities was also incorporated, e.g. Northern Avenue “Super-street”, Sun Valley Parkway, and the CANAMEX Corridor north of I-10. Minor additional arterial improvements were also made.

4. **New Corridors** – Potential new freeways and partially controlled access facilities are tested in Package 4². This includes:

² Three options or alternative scenarios, referred to as Options A, B, and C were modeled regionally. Only Options A and C were relevant to NWATS. Option A and C are similar except in the treatment of I-17 between I-10 and Loop 101. Option A adds substantial new capacity equivalent to approximately five or six additional lanes in

- Loop 303 as freeway from I-10 to I-17
- New River Extension freeway from Loop 303 to New River Road
- Wickenburg Bypass – new facility
- Carefree Highway Expressway – 6 lane expressway.
- Loop 101/Loop 303 Connector
- I-17 improvements:
 - Option A, 20-lane facility between Loop 101 and I-10.
 - Option C, an additional lane in each direction between Peoria Avenue and Loop 101.
- Various freeway interchanges.

5. **Total Package** – This package in concept combines projects from each scenario or modeling package listed above with the additional transit improvements to be recommended in the High Capacity Transit Study and the Regional Transit Systems Study that are concurrently in development. This total package could not be modeled in advance of completion of the two transit studies. The currently-available interim results of those studies are presented where appropriate to reflect the transit element of a long term plan for NWATS.

Table 6 below shows a comparison of the various model runs. The bottom line (summarized in Table 7) is that the performance of the scenarios improves as additional roadway capacity is introduced. Despite significant growth in vehicle miles traveled, the quality of travel improves when dramatic increases in capacity are modeled.

each direction while Option C reflects the existing long range plan with minimal widening.

Table 6: NWATS 2020 and 2030 Network Comparisons

Measure	2000	2020				2030			
		Future Base	Enhanced	New Corridors (A)	New Corridors (C)	Future Base	Enhanced	New Corridors (A)	New Corridors (C)
Centerline Miles									
FREEWAY	114	135	140	178	196	135	140	178	196
HOV	22	27	97	91	97	27	97	91	97
STREET	993	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
TOTAL	1,155	1,809	1,879	1,912	1,937	1,809	1,879	1,912	1,937
Lane Miles									
FREEWAY	567	710	1,063	1,655	1,630	710	1,063	1,655	1,630
HOV	545	54	215	194	217	54	215	194	217
STREET	3,146	7,197	7,348	7,245	7,245	7,197	7,348	7,245	7,245
TOTAL	3,859	7,919	8,626	9,094	9,092	7,919	8,626	9,094	9,092
Daily VMT									
FREEWAY	9,200,000	14,900,000	19,000,000	25,000,000	22,700,000	14,800,000	21,600,000	29,900,000	29,400,000
HOV	370,000	800,000	1,900,000	2,100,000	1,500,000	1,000,000	3,000,000	2,000,000	2,400,000
STREET	11,400,000	29,900,000	27,500,000	22,100,000	23,000,000	43,800,000	41,300,000	33,400,000	34,400,000
TOTAL	21,000,000	45,600,000	48,400,000	49,500,000	47,200,000	60,000,000	66,000,000	66,400,000	66,200,000
LOS (number of intersections)									
D	77	117	120	131	114	75	81	90	93
E and F	72	263	217	126	159	456	409	261	291
% congested	31%	52%	48%	46%	45%	62%	55%	41%	43%
Congested Lane Miles									
FREEWAY	42	202	119.81	46.77	75.8	317	306	184	217
HOV	--	23.8	12.3	1	8.8	33	75	21	29
STREET	222	1,052	556	263	356	2,414	1,851	832	937
% congested	7%	16%	8%	3%	5%	35%	26%	11%	13%
Hours of Delay									
FREEWAY	47,043	322,000	176,300	58,792	99,099	1,153,623	584,933	231,862	288,490
HOV		14,000	4,474	213	3,129	61,286	40,414	13,133	13,542
STREET	110,850	630,600	325,389	166,091	203,707	3,790,770	1,604,885	515,314	615,140
Average Speed									
FREEWAY	57	40	47	55	53	21	35	49	45
HOV	60	57	60	61	60	41	56	51	58
STREET	29	26	29	29	29	16	23	28	26

6.1 Model Run Conclusions

In analyzing the results of the regional travel demand model, there are a couple of key measures that help describe the performance of a facility or system.

Level of Service

Level of Service (LOS) is the term used to describe the degree of traffic congestion on a roadway. The various levels of service range from A to F, in increasing order of congestion.

Level of Service can be estimated for various different roadway parameters and time frames. LOS can be calculated for roadway segments, intersections, freeway mainline, and ramps. LOS can also be calculated for different time periods including daily, AM peak hour, and PM peak hour.

Volume to Capacity Ratio

The operating efficiency of a roadway segment can further be defined by comparing volume to capacity (v/c.) The ratio of the volume on a segment of road compared to the traffic capacity of the segment is known as the v/c ratio. This is calculated for each segment by simply dividing the traffic volume or forecast for the segment by the capacity of the segment. For this analysis, the daily volume was compared to the daily capacity to obtain a v/c ratio.

The volume to capacity ratio is equated to level of service to define the performance of a road segment. The relationship between V/C ratio and level of service is summarized in the table below.

Table 7: LOS and V/C Relationship

LEVEL OF SERVICE	V/C RANGE
A	0.0 to 0.6
B	0.61 to .7
C	0.71 to 0.8
D	0.81 to 0.9
E	0.91 to 1.0
F	greater than 1.0

Analysis of Model Results

Not surprisingly, each set of improvements beyond the Future Base Network provides some benefit. As the major improvements are added to the plan, the modeling results show a marked improvement in level of service and a reduction of the number of lane-miles that show V/C greater than .9. Though many lane miles are added in the Future Base Network, the number of lane miles that reach V/C ratios above .9 grows more than tenfold. This is largely because the new corridors are primarily in the growing areas of the Northwest Valley, where they will support future growth.

The increase in congestion is primarily located within already developed areas, where opportunities to add lane capacity are constrained by potential high impacts and costs. The elements of the Enhanced Network improve the performance of the system, reducing the congested lane-mile count by over 20%. The addition of new corridor improvements substantially reduces congestion impacts by an additional 45%. Comparable improvements are noted in the number of congested intersections. Table 8 on the next page summarizes salient model results.

Table 8: Roadway Performance Measures

Measure	2002	Future Base	Enhanced	New Corridors
VMT (million)	21	62	66	66
Lane Miles (V/C >.9)	250	2,800	2,200	1,200
Congested Intersections	99	456	409	281

This New Corridors analysis shows, however, that funding major roadway improvements, such as freeways and major corridors, have a much greater impact on congestion mitigation and improving overall system performance than smaller roadways.

Transit planning work currently underway includes a substantial number of new transit

corridors. However, at the time of preparation of this report, modeling information is not available from the High Capacity Transit Study or the Valley Metro Regional Transit System Study to establish their contribution to the performance of the overall

transportation system. Results from these transit studies will be considered in the RTP process.

Contribution of other modes to congestion mitigation is less quantifiable. These modes however improve mobility and quality of life and should be viewed in that light.

7. Recommendations

The study developed recommendations for project priorities based on their anticipated contribution to the long-term effectiveness of the regional system. Recommendations from the Northwest Area Transportation Study will be considered and analyzed further as appropriate in the MAG Regional Transportation Plan (RTP).

Potential projects identified and modeled were reviewed and ranked in terms of their contributions and benefits to improving the overall system. Measures used for the assessment and ranking and the resulting modeled figures are listed in Table 5. The criteria place an emphasis on projects that carry major volumes of regional traffic, close critical gaps, or offer alternatives to single occupant travel in heavily congested corridors.

The list of key projects is further divided into three levels based on funding availability, support from the community, and timing.

Some projects may be very important in the long-term context of the RTP but may not be critical until a later date because they address program elements for which congestion or impacts are not anticipated until further growth occurs.

While there is no single interpretation about the relationship between need and cost, the type of project also offers suggestions for funding. For example, arterials in developing areas that serve new growth exclusively are likely to be funded largely from development contributions. Projects that take place on regional facilities in fully urbanized areas are more likely to qualify for regional funds.

7.1 Priority Projects

The following pages describe the recommended projects for the Northwest area. First, key projects are listed within their functional categories. The roadway categories include freeways, expressways, parkways, superstreets, and

arterials/highways. The transit categories include light rail/bus rapid transit, commuter rail and fixed route bus service. Bicycle / pedestrian projects have been shown in all phases under the “options” category.

Following the functional category listing of projects, the projects are prioritized for near-, mid- and long-term. For each term, a map of the projects along with a table listing the project, added lane miles, and estimated costs are provided.

Alignments and other major design elements for new freeways, highways, and arterials are subject to change following the completion of needed location/design concept studies. Local plans affecting the arterial system are subject to change, particularly in rapidly-growing areas.

7.1.1 Freeways

In this list, emphasis has been placed on those projects that have an immediate need and are likely to be justified in terms of cost. For example, no improvements are listed for I-10 west of CANAMEX or on I-17 north of Black Canyon City because they do not represent critical needs. In general, the recommendation is also to acquire sufficient right-of-way to accommodate all lanes required on all freeways, including HOV lanes, but that HOV lanes should be built only when they are justified by demand. Freeway projects are recommended for:

- I-10 – Addition of general purpose and HOV lanes. (An I-10 Reliever roadway is proposed in the Southwest Area Transportation Study and the HCTS recommends evaluation of LRT/BRT along the I-10 Corridor. Designs for I-10 improvements should consider these needs.)

- Loop 101 – Addition of general purpose lane and addition of an HOV lane.
- I-17 – Addition of general purpose and HOV lanes. Some segments require further study.
- Loop 303 – Construction of a new freeway and HOV facility.

(The recommendations of the ADOT Design Concept Reports for I-17 and Loops 101 and 303 are incorporated by reference.)

7.1.2 New and Reconstructed Interchanges

The improvement to the freeway system includes new interchanges, modifications to existing interchanges, and an HOV direct connection. The locations are also shown in Figures 3, 4, 5, and 6.

New interchanges are proposed on I-10 at the CANAMEX Corridor (in the vicinity of 355th Avenue pending a final alignment to be further defined in a future ADOT study) and Wilson Road west of the White Tank Mountains.

Other interchanges on I-10 are to be located at Bullard, Johnson, Perryville, and possibly El Mirage/Dysart Roads to improve access in the east of the White Tanks. A potential I-10 / El Mirage interchange and/or crossing will be the subject of further study as part of an El Mirage/Dysart arterial roadway corridor analysis. The El Mirage location is difficult to manage operationally and financially on the north side of the freeway because of proximity to adjacent interchanges, impact on local neighborhoods and a major Agua Fria River crossing.

I-10 will include a system interchange at the new Loop 303 that will also need to address access to Cotton Lane and Sarival Road.

A system HOV Connector system is proposed for I-10 at Loop 101 and an additional HOV interchange at 59th Avenue as well as completion of a full HOV interchange at 79th Avenue.

An I-10 Corridor Profile Study is currently underway by ADOT that may identify additional needs or help to refine results from this study and the RTP.

Improvements to I-17 are not yet fully defined south of Peoria Avenue, but new interchanges have been identified for Dove Valley Road and Jomax Road in North Phoenix. A system interchange at I-17 and Loop 303 near Lone Mountain Road will be part of the new freeway program for Loop 303 (including a half interchange at Dixileta/I-17 and an interchange at 43rd Avenue/Loop 303) as well as a system interchange at I-17 and New River as part of the New River Extension.

I-17 will add an HOV Connector at Loop 101 and HOV ramps near Peoria to improve HOV circulation in the corridor and better serve the MetroCenter park-and-ride facility. In addition to the HOV Connectors at I-10 and I-17, Loop 101 will provide HOV ramps at Maryland Road and 59th Avenue and a full interchange at Bethany Home Road.

Lastly, Loop 303 will provide access at appropriately spaced locations along the entire 33 mile route to intersecting arterials. When built, Loop 303 will also furnish system interchanges at the New River Extension and at Carefree Highway to accommodate potential new freeways in those corridors.

7.1.3 Freeway Operational Improvements

The ADOT Freeway Management System (FMS) employs many of the Intelligent Transportation System (ITS) technologies.

The system includes fiber optic communications, ramp metering, CCTV cameras, vehicle detectors, and variable message signs. There are 90 miles of freeway currently in operation in the Northwest Valley. ADOT has made a commitment to ITS and maintaining the FMS and will continue to add ITS features to the existing system. New sections of freeway will be designed and constructed with the ITS elements included. ADOT estimates the cost for these facilities on the freeway system to be \$1 million per mile. Applying this estimate, it would cost \$156 million to provide FMS/ITS features on the 156 miles of existing, potential, and programmed freeways within the study area.

The traffic signal systems and coordination in the Northwest Valley are operated independently by each city. With the exception of Phoenix and Glendale, there are no centralized signal control systems in the area. However, Glendale, Peoria and Surprise are planning to implement such systems in the near future. This will lead to greater fragmentation which limits the opportunities for area wide implementation of signal coordination in the near future. Consistent with the MAG ITS Strategic Plan, Phoenix, Peoria, Surprise, and Glendale are part of the regional ITS program that encourages signal coordination across jurisdictional boundaries. These agencies will soon have the ability to provide traffic-related information to other neighboring cities and the State for incident identification/response and the prospect of interjurisdictional coordination of signals.

Another freeway operational feature that is currently in use is the Freeway Service Patrol. It is a cooperative effort among Department of Public Safety (DPS), Arizona Automobile Association (AAA), MAG, and

ADOT. Trained personnel use specially equipped vehicles to assist stranded motorists and remove road hazards. The service is available 18 hours a day, 7 days a week. This service is currently programmed through fiscal year 2007. As freeways volumes grow and become more congested, it will be important to continue and expand this service.

7.1.4 Freeway Maintenance

In order to maintain the integrity of the freeway system, the facilities need to be maintained to acceptable service conditions. Freeway maintenance includes providing a satisfactory riding surface for the traveling public. The roadway surface should be kept relatively clean with minimal cracking and rutting. If the surface is maintained, the frequency of reconstruction can be minimized.

The term “maintenance” also includes litter control as well as landscape maintenance, including restoration.

7.1.5 Expressways / Superstreets / Parkway / Arterial Roadway Corridors (ARC)

There is a lack of capacity within the arterial system in the Northwest Valley as a result of system discontinuities in a number of areas. For planning purposes, new expressways are considered to have partial access control and to be upgradeable to freeway standards when demand warrants and funding becomes available. Parkways are similar but may have additional landscaping and beautification, and may or may not be upgradeable to full freeway standards. Super-streets are enhanced arterials. The regional model does not have categories for parkways or super-streets, so these facilities were typically modeled as expressways for this analysis.

The term “arterial roadway corridor” (ARC) refers to minimum four-lane facilities that operate as controlled access roadways, enhanced arterials (in the urban area), or possibly parkways, expressways or even standard arterials depending on future demand. In each case, an arterial roadway corridor will require a more detailed assessment to determine the exact location and configuration of the facility and may need to be treated as a multi-facility corridor in some cases.

Projects in this category are:

- Grand Avenue – A Phase II MIS is currently underway to further refine the corridor needs between I-17 and Loop 101. Right of way preservation is identified north of Loop 303 to SR 74. The entire Grand Avenue Corridor, from Van Buren to Wickenburg is identified as an ARC and will call for varying degrees of access control and additional study, particularly in northerly areas leading away from the urbanized area. The recently completed Grand Avenue Northwest Study between Loop 101 and Loop 303 recommended specific improvements (e.g., widening, grade separations, etc.) and classified the roadway as an “enhanced arterial/limited expressway.”
- Northern Avenue Superstreet– City of Glendale concept for enhancing east-west capacity
- Carefree Expressway - possible controlled access west of Loop 303 (including consideration as a future freeway with a system interchange at Loop 303 subject to further ADOT analysis.) It will remain an arterial between Loop 303 and I-17.
- Loop 303/Loop 101 Connector– Enhanced roadway to accommodate

future volume between Loop 303 and Loop 101.

- Sun Valley Parkway/Bell Road, including the extension north to US 60 – Major corridor west of the White Tank Mountains in response to rapid growth anticipated for the area.
- CANAMEX Corridor– Major western corridor to be built to accommodate regional commercial traffic.
- Wickenburg Bypass– long sought commercial traffic bypass of Wickenburg downtown.
- El Mirage/Dysart Parkway– major corridor to provide additional north-south capacity
- Jomax/Happy Valley Parkway– major east-west corridor to provide relief to Bell Road as development occurs. It will remain a major arterial east of 67th Avenue.

7.1.6 Bridges

As part of the improvement of the existing arterial highway system, there are key river crossings that should be provided to ensure continuity of key routes in the Northwest Valley. In the easterly portion of the study area, the New River crossing at Beardsley Road, in combination with a partial freeway interchange is a key improvement. Also, Peoria Avenue over the Agua Fria is critical to circulation in the communities of El Mirage, Youngtown and Peoria.

In the southern area of the study on the Agua Fria River, new bridges are recommended at Indian School Road and Thomas Roads and a widening of the bridge at McDowell Road.

In the western NWATS area, the new corridor system will require a number of crossings of the Hassayampa River to accommodate the anticipated development activity in Buckeye that should be built into the cost of building the new corridor system. Similar cases will

present themselves in the North Phoenix, Peoria and Surprise areas with projects such as 67th Avenue over the CAP Canal which link new growth in those cities.

7.1.7 Policies

There are policy matters that must also be taken into account in the future transportation plan. These are longstanding issues that will need to be addressed as regional solutions to the limitations of the arterial highway system:

- Safety and Intelligent Transportation Systems – projects that ensure the safe and efficient use of the highway system should be given regional priority consideration.
- Arterial Grid Continuity – closing gaps, mitigating obstructions, ensuring long term grid continuity should be a fundamental regional objective in arterial highway priorities.
- Scalloped Streets – eliminating capacity gaps caused by leapfrog development activity may require regional attention and priority in locations where the demand cannot be otherwise accommodated.
- Preservation of Right-of-Way – the early protection of rights-of-way for all modes of travel, where possible before development takes place, should become a regional policy supported by all cities. This will be a critical element in ensuring the integrity of the arterial roadway corridors as they are expanded in the future to accommodate higher demand.
- Avoid creation of T-intersections, such as is now found at I-10 and Sun Valley Parkway and I-10 and SR 85 and of six-legged intersections such as those along Grand Avenue.

7.1.8 Transit Projects

The final determination of the proposed system elements will be largely defined by

studies currently underway at MAG and RTPA, but recommendations in this report are presented based on preliminary information from the two studies to reflect a potential multimodal system. Each transit system element in the Northwest Valley is addressed individually using the preliminary results of the High Capacity Transit Study (HCTS) and the Regional Transit Systems Study (RTSS.) Final recommendations including priorities and funding will be made as part of the MAG RTP process.

It should also be noted that because the modeling timeframe for the transit studies was 2040, as opposed to 2030 for the highway projections, the identified implementation terms for some high capacity transit projects have been adjusted to be more consistent with highway implementation terms. Costs of some of the high capacity projects are likely to have an influence over how these projects are ultimately prioritized. The results here are shown as a means of addressing a first cut at a multimodal plan.

HCTS high-capacity transit corridor recommendations are listed below:

- BNSF – Downtown Phoenix to Loop 303 Commuter Rail/BRT. The Grand Avenue MIS Phase II will evaluate transit needs in greater detail and make recommendations for transit along Grand Avenue south of Loop 101.
- Glendale Avenue Extension LRT
- I-10 West Corridor LRT/BRT. This will require further coordination with ADOT in the I-10 Corridor as improvements are defined for that area.
- Metrocenter/I-17 LRT
- I -17 Corridor LRT/BRT
- 59th Avenue – Bell Road to I-10 West LRT/BRT
- Bell Road – I-17 to Loop 303 LRT/BRT

The Regional Transportation Plan may identify alternative high capacity routes to serve large activity centers.

7.1.9 Fixed Route Transit

The results of the Regional Transit Systems Study will determine the manner in which priority is assigned in the regular bus route system. In the Northwest, the emphasis should be placed on helping to relieve congestion on the arterial highway network. Most of the fixed route demand will be in the most heavily urbanized portions of the study area and deployment should occur in the first two terms to maximize the benefit of the service in congested areas. Bus system expansion is relatively inexpensive and the recommendation is to deploy all identified service within the short / midterm portions of the program (subject to results of the RTSS.)

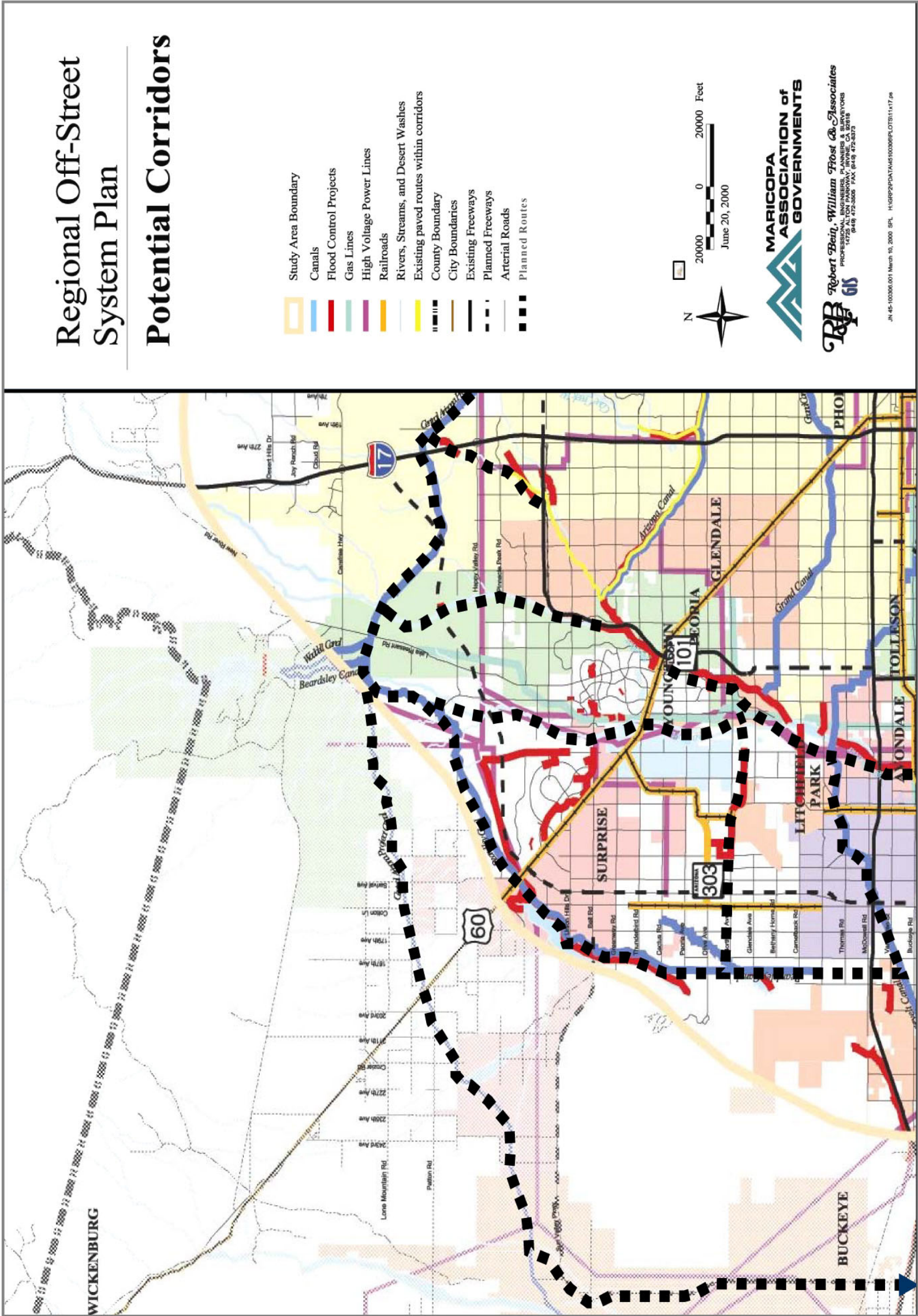
7.1.10 Non-Motorized Projects

The estimated costs of the regional bicycle system expansion are proposed to be divided among the short, mid and long terms as a line item in each that must be considered in the development of the overall multimodal plan. The allocation of funds to specific projects should be justified by:

- Extension of existing regional elements;
- New linkages of existing regional elements;
- New regional system elements; and
- Agreement of multiple agencies.

Figure 6 on the next page shows the recommendations for non-motorized off-road projects. A thorough evaluation of these options and of the entire bicycle pedestrian plan is recommended to properly define the ultimate configuration of the non-motorized transportation system in concert with roadways and transit needs.

Figure 6: Recommended Non Motorized Corridors



7.1.11 Cost Estimates

Preliminary estimates are provided for all projects. These estimates are preliminary and subject to change in the final RTP. Contingency allowances have generally not been included but are expected to be incorporated into the estimates developed for the RTP.

Capital Costs

Capital Costs were estimated in a manner consistent with the other subarea studies based on a project type average cost table. Where more detailed project specific estimates were available, they were used instead of the table. As the RTP is further refined, there could be significant changes in the costs of some projects.

Operating Costs

The focus of the NWATS was on identification of the capital projects that would be considered in the development of the RTP. Costs associated with projects identified in this report are only for capital development. Annual costs will be deferred to the RTP as part of the region wide need to assess the implications of operations and maintenance funding on the future of the transportation system as a whole.

Table 9 and Figure 7 are a summary table and map, respectively, depicting total recommended projects. Cost tables and maps for each of the recommendation phases, i.e., near-, mid-, and long-term, are provided following Figure 7. The cost estimates and phasing are subject to change in the RTP process.

Table 9: Priority Summary

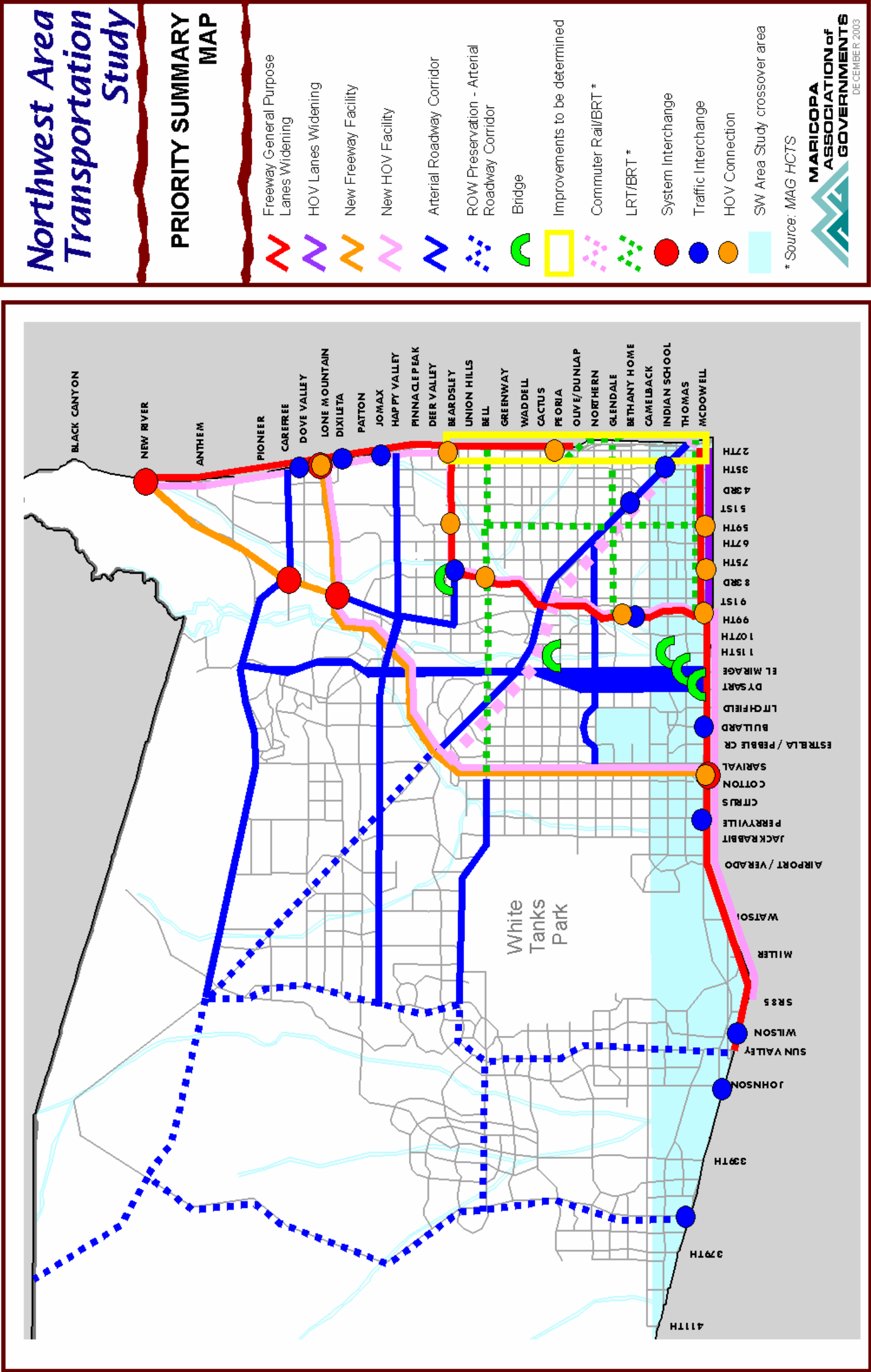
All Priority Projects		Lanes Added (each direction)	Total lanes (each direction)	Project Cost in millions (Cost estimates will be refined in RTP)	Totals
Freeways (includes Freeway Management System)					
I-10	I-10 General Purpose Lanes Widening (I-17 to Loop 101)	1	5	\$540	
	I-10 HOV Lanes Widening (I-17 to Loop 101)	1	2	\$194	
	I-10 General Purpose Lanes Widening (Loop 101 to Sun Valley Parkway)	3	5	\$552	
	Bullard TI			\$16	
	Perryville TI			\$16	
I-17	Wilson TI			\$16	
	Johnson TI			\$16	
	CANAMEX TI (355th Avenue)			\$35	
	I-10 HOV Lanes Widening (Loop 101 to SR 85)	1	1	\$126	
	79th Ave HOV ramps (west)			\$8	
Loop 101	59th Ave HOV ramps			\$15	
	I-17 General Purpose Lanes north of Loop 101 to Loop 303	3	5	\$156	
	I-17 General Purpose Lanes north of Loop 303 to Black Canyon City	2	4	\$133	
	Dove Valley TI			\$16	
	Jomax TI			\$16	
Loop 303	Peoria Avenue HOV ramps			\$16	
	I-17 HOV Lanes north of Loop 101 to New River	1	1	\$102	
	I-17 General Purpose Lanes south of Loop 101, north of Dunlap	1	4	\$280	
	I-17 south of Loop 101 to I-10	TBD	TBD	\$1,000	
	Subtotal I-17			\$1,719	
Loop 101	Loop 101 General Purpose Lanes widening	1	4	\$176	
	Beardsley ramps			\$8	
	Bethany Home TI			\$16	
	Loop 101 HOV lanes	1	1	\$132	
	Loop 101 HOV Connectors to I-10			\$35	
Loop 303	Loop 101 HOV Connectors to I-17			\$35	
	59th Ave HOV ramps			\$15	
	Bell Road HOV ramps			\$15	
	Maryland HOV ramps			\$15	
	Subtotal Loop 101			\$447	
Loop 303	Loop 303 south of US 60	4	4	\$495	
	System TI at I-10			\$54	
	Right of way preservation north of US 60			\$180	
	Loop 303 north of US 60	4	4	\$611	
	System TI at I-17 (at Lone Mountain), including Ties at 43rd Ave., Dixielita and Dove Valley			\$90	
Loop 303	Loop 303 HOV lanes	1	1	\$216	
	HOV Connector at I-17			\$35	
	HOV Connector at I-10			\$35	
	Loop 303 - New River Extension			\$142	
	System TI at Loop 303 (New River extension)	3	3	\$238	
Loop 303	System TI at I-17 (at New River)			\$70	
	System TI at Carefree Hwy			\$50	
	Subtotal Loop 303			\$2,286	
	Freeway Total				\$5,986

Table 9: Priority Summary (continued)

Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (including \$100,000/mile for ITS) - Potential Freeway		1	2	\$468
Carefree Highway (US 60 to Loop 303 in freeway right of way)				
Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (including \$100,000/mile for ITS)				
Grand Avenue s/o Loop 101 (additional grade separations)				
Grand Avenue - Loop 101 to Loop 303	1	3		\$100
Grand Avenue (Loop 303 to Sir 74) right of way preservation		1		\$134
Northern Avenue Superstreet	2	4		\$67
El Mirage/Dysart Roads	1 to 2	3		\$256
Carefree Parkway (Loop 303 New River Extension - I-17)	2	3		\$126
Loop 101/Loop 303 Connector Expressway	1	3		\$39
Sun Valley Parkway	1	3		\$25
Sun Valley Parkway extension north of Bell Road	3	3		\$124
Bell Road (Sun Valley to Loop 303)	2	3		\$62
Happy Valley/Jomax Roads	1 to 3	3		\$54
CANAMEX (row preservation)	2	2		\$144
New or widened river bridges at Peoria, Thomas, Indian School, and McDowell Roads				\$230
Wickenburg Bypass	2	2		\$45
				\$220
		ESPA Total		\$2,094
High Capacity Transit - from High Capacity Transit Study (HCTS)				
Grand Avenue - (Commuter Rail/BRT) (HCTS mid and long term)				\$739
Glendale Avenue (LRT/BRT) (HCTS near and mid term)				\$430
I-10 West (LRT) (HCTS near term)				\$400
Metrocenter/I-17 (LRT) (HCTS near term)				\$340
59th Avenue - I-10 (LRT/BRT) (from HCTS mid and long term)				\$518
Bell Road - I-17 to Loop 303 (LRT/BRT) (from HCTS near and long term)				\$371
		HCT Total		\$2,798
Fixed Route Transit - from Regional Transit Systems Study (RTSS)				
Buses				\$132
Park and Ride Lots				\$83
Stations				\$14
		Fixed Route Total		\$229
		Non Motorized Total		\$200
		Other Total		\$225
Arterial grid/scalloped street program/safety		Program Total		\$11,532

Notes: Auxiliary lanes are not counted in one-way total. Costs and phasing are preliminary and subject to change in the final RTP.

Figure 7: Priority Summary Map



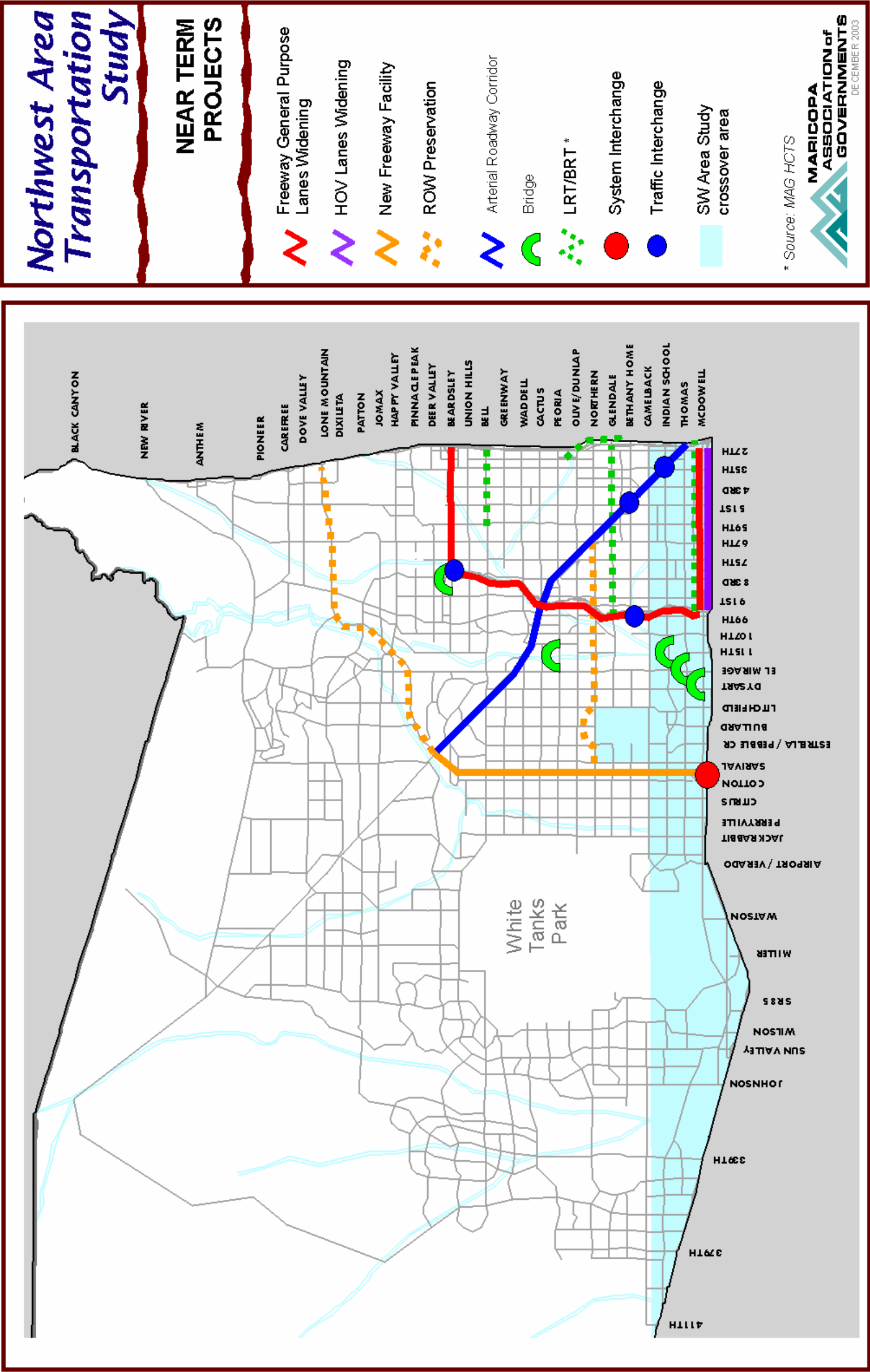
Alignments and other major design elements for new freeways, highways, highways, and arterials are subject to change following the completion of needed location/design concept studies. Local plans affecting the arterial system are subject to change, particularly in rapidly-growing areas.

Table 10: Near Term Projects

Near Term Projects	Lanes Added (each direction)	Total Lanes (each direction)	Project Cost in millions (Cost estimates will be refined in RTP)	NWATS Short Term Total (millions)
Freeways (includes Freeway Management System)				
I-10				
I-10 General Purpose Lanes Widening (I-17 to Loop 101)	1	5	\$540	
79th Ave HOV ramps (west)			\$8	
I-10 HOV Lanes Widening (I-17 to Loop 101)	1	2	\$194	
Loop 101				
Loop 101 General Purpose Lanes widening	1	4	\$176	
Bethany Home TI			\$16	
Beardsley TI			\$8	
Loop 303				
Loop 303 south of US 60	4	4	\$495	
System TI at I-10			\$70	
Loop 303 north of US 60 preservation of right-of-way			\$180	
			Subtotal	\$1,687
Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (including \$100,000/mile for ITS)				
Grand Avenue s/o Loop 101 (additional grade separations)				
Indian School TI			\$50	
Bethany Home TI			\$50	
Grand Avenue - Loop 101 to Loop 303	1	3	\$134	
w/widened river bridges at Peoria, Thomas, Indian School, and McDowell Roads			\$45	
Northern Avenue preservation of right-of-way			\$40	
			Subtotal	\$319
High Capacity Transit - from High Capacity Transit Study (HCTS)				
I-10 West LRT (HCTS near term)			\$400	
Glendale Avenue LRT (HCTS near term)			\$430	
Metrocenter/I-17 LRT (HCTS near term)			\$340	
Bell Road - 59th Avenue to I-17 (HCTS near term)			\$114	
			Subtotal	\$1,284
Fixed Route Transit - from Regional Transit Systems Study (RTSS)				
Buses			\$72	
Park and Ride Lots			\$60	
Stations			\$14	
			Subtotal	\$146
Nonmotorized (Bicycle/Pedestrian)			\$60	
			Subtotal	\$60
Other Items				
Arterial grid/scalloped street program/safety			\$75	
			Subtotal	\$75

Notes: Auxiliary lanes are not counted in one-way total. Costs and phasing are preliminary and subject to change in the final RTP.

Figure 8: Near Term Projects



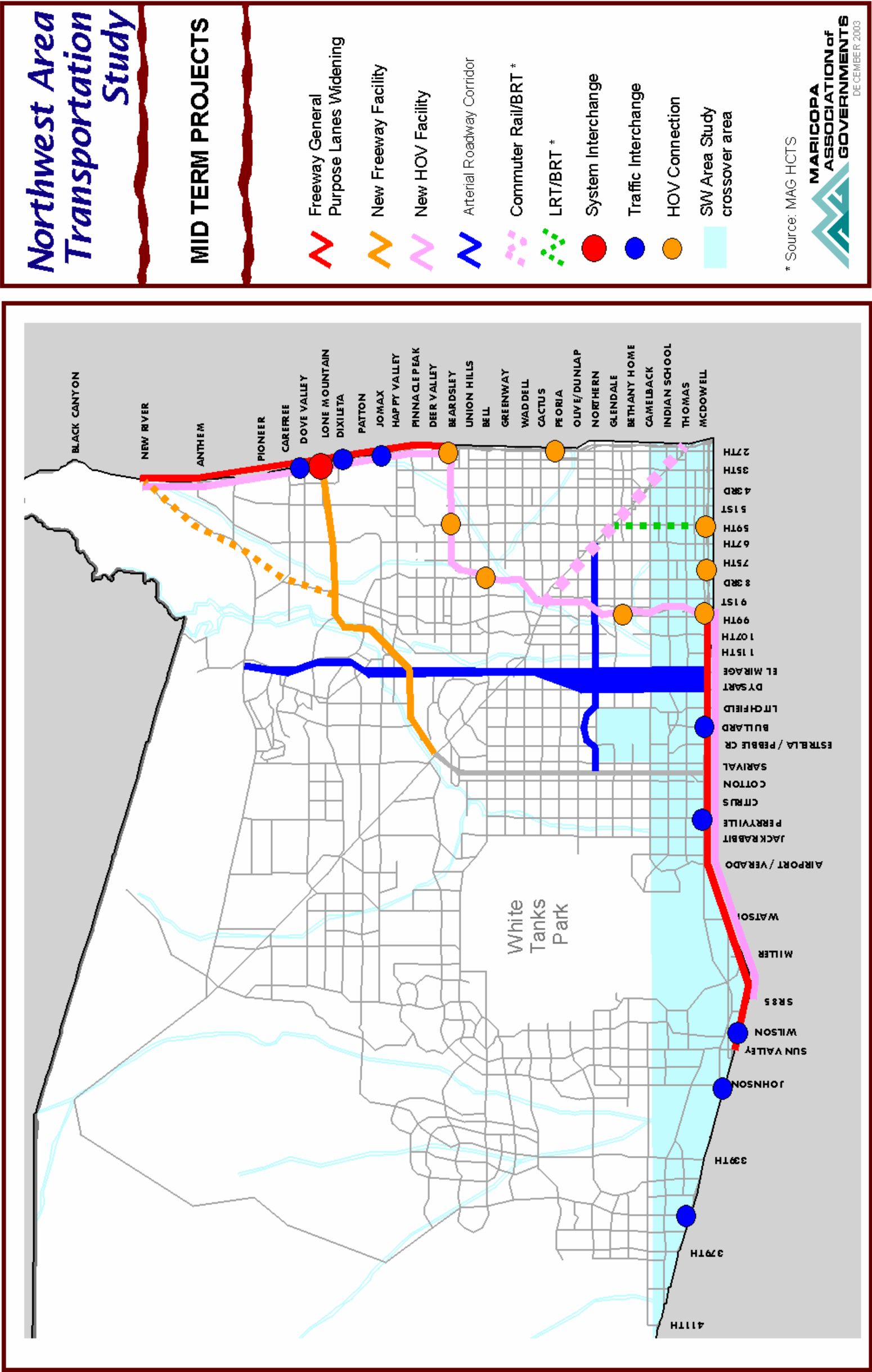
Alignments and other major design elements for new freeways, highways, and arterials are subject to change following the completion of needed location/design concept studies. Local plans affecting the arterial system are subject to change, particularly in rapidly-growing areas. Phasing is subject to change in the RTP process.

Table 11: Mid Term Projects

Mid Term Projects	Lanes Added (each direction)	Total Lanes (each direction)	Project Cost in millions (Cost estimates will be refined in RTP)	NWATS Mid Term Total (millions)
Freeways (includes freeway management system)				
I-10				
I-10 General Purpose Lanes Widening (Loop 101 to Sun Valley Parkway)	3	5	\$552	
Bullard TI			\$16	
Perryville TI			\$16	
Johnson TI			\$16	
Wilson TI			\$16	
CANAMEX TI (355th Avenue)			\$35	
I-10 HOV Lanes Widening (Loop 101 to SR 85)	1	1	\$126	
59th Avenue HOV ramps			\$15	
Loop 101				
Loop 101 HOV lanes	1	1	\$132	
Loop 101 HOV Connectors to I-10			\$35	
Loop 101 HOV Connectors to I-17			\$35	
59th Ave HOV ramps			\$15	
Bell Road HOV ramps			\$15	
Maryland HOV ramps			\$15	
I-17				
I-17 General Purpose Lanes north of Loop 101 to Loop 303	3	5	\$156	
I-17 General Purpose Lanes north of Loop 303 to New River	2	4	\$133	
Dove Valley TI			\$16	
Jomax TI			\$16	
Peoria Avenue HOV ramps			\$16	
I-17 HOV Lanes north of Loop 101 to New River	1	1	\$102	
Loop 303				
Loop 303 north of US 60	4	4	\$611	
m TI at I-17 (at Lone Mountain including TI at 43rd Ave and partial TI at Dixileta)			\$90	
Loop 303 - New River Extension - preservation of right-of-way			\$142	
			Subtotal	\$2,321
Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (including \$100,000/mile for ITS)				
Northern Avenue Superstreet	2	4	\$216	
El Mirage/Dysart Roads	1 to 2	3	\$126	
			Subtotal	\$342
High Capacity Transit - from High Capacity Transit Study (HCTS)				
Grand Avenue - Phase 1 (Commuter Rail/BRT) (HCTS mid term)			\$293	
59th Avenue LRT/BRT - Glendale Ave to I-10 West (HCTS mid term)			\$216	
			Subtotal	\$509
Fixed Route Transit - from Regional Transit Systems Study (RTSS)				
Buses			\$60	
Park and Ride Lots			\$23	
			Subtotal	\$83
Nonmotorized (Bicycle/Pedestrian)				
			Subtotal	\$40
Other Items				
Arterial grid/scalloped street program/safety			\$75	
			Subtotal	\$75
Total Mid Term				\$3,370

Notes: Auxiliary lanes are not counted in one-way total. Costs and phasing are preliminary and subject to change in the final RTP.

Figure 9: Midterm Projects



Alignments and other major design elements for new freeways, highways, and arterials are subject to change following the completion of needed location/design concept studies. Local plans affecting the arterial system are subject to change, particularly in rapidly-growing areas. Phasing is subject to change in the RTP process.

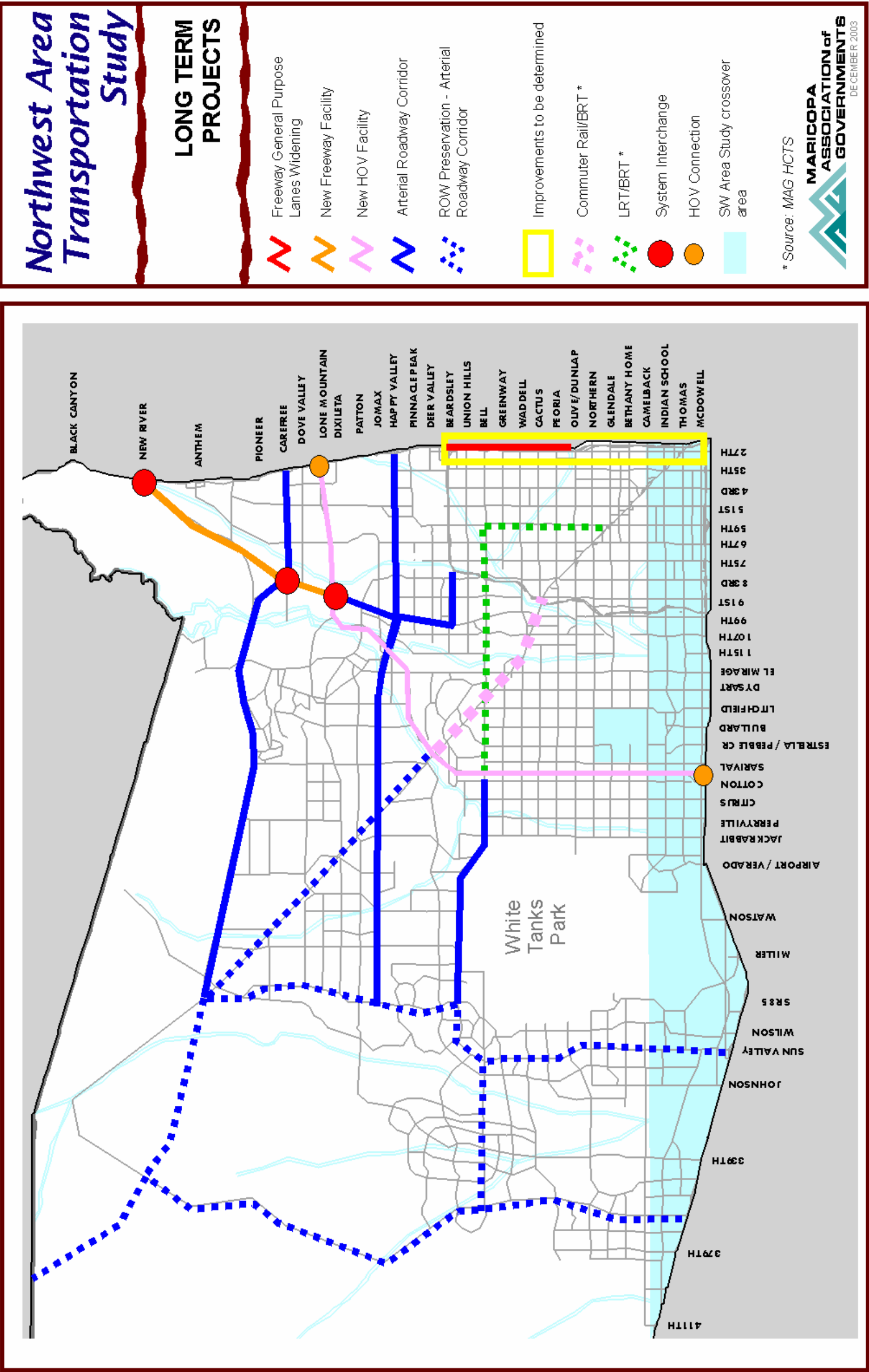
Table 12: Long Term Projects

Long Term Projects	Lanes Added (each direction)	Total Lanes (each direction)	Project Cost in millions (Cost estimates will be refined in RTP)	NWATS Long Term Total (millions)
Freeways (includes FMS)				
Loop 303				
Loop 303 HOV lanes	1	1	\$216	
HOV Connector at I-17			\$35	
HOV Connector at I-10			\$35	
Loop 303 - New River Extension	3	3	\$238	
System TI at Loop 303			\$70	
System TI at I-17 (at New River)			\$70	
System TI at Carefree Hwy			\$50	
I-17				
I-17 General Purpose Lanes south of Loop 101, north of Peoria	1	4	\$280	
I-17 south of Loop 101 to I-10	TBD	TBD	\$1,000	
			Subtotal	\$1,994
Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (incl. \$100,000/mile for ITS) - Potential Freeway				
Carefree Highway (US 60 to Loop 303 New River Extension)*	1	2	\$468	
Expressways/Superstreets/Parkways/Arterial Roadway Corridors (ARCS) (including \$100,000/mile for ITS)				
Carefree Parkway (Loop 303 New River Extension - I-17)	2	3	\$39	
Loop 101/Loop 303 Connector Expressway	1	3	\$25	
Sun Valley Parkway	1	3	\$124	
Grand Avenue (Loop 303 - SR 74) right of way preservation	1	1	\$67	
Sun Valley Parkway extension north of Bell Road	3	3	\$62	
Bell Road (Sun Valley Extension to Loop 303)	2	3	\$54	
Happy Valley/Jomax Roads	1 to 3	3	\$144	
CANAMEX (right-of-way preservation)*	2	2	\$230	
Wickenburg Bypass (west of CANAMEX)*	2	2	\$102	
Wickenburg Bypass (east of CANAMEX)	2	2	\$118	
			Subtotal	\$1,433
High Capacity Transit - from High Capacity Transit Study (HCTS)				
59th Avenue LRT/BRT - Bell Road to Glendale Avenue (HCTS long term)			\$302	
Bell Road - 59th Avenue to Loop 303 (LRT/BRT) (HCTS long term)			\$257	
Grand Avenue - Phase 3 (HCTP long term)			\$446	
			Subtotal	\$1,005
Nonmotorized (Bicycle/Pedestrian)				
			\$100	
			Subtotal	\$100
Other Items				
Arterial grid/scalloped street program/safety minimum allocation			\$75	
			Subtotal	\$75
Total Long Term				\$4,607

* Assumes freeway width right-of-way

Notes: Auxiliary lanes are not counted in one-way total. Costs and phasing are preliminary and subject to change in the final RTP.

Figure 10: Long Term Projects



Alignments and other major design elements for new freeways, highways, and arterials are subject to change following the completion of needed location/design concept studies. Local plans affecting the arterial system are subject to change, particularly in rapidly-growing areas. Phasing is subject to change in the RTP process.

7.1.12 Other Plan Considerations

Other items to be considered include policy matters such as eliminating scalloped streets, protecting and expanding the arterial grid and preserving right of way which should be viewed as near term items given the implications they have on future system development. These will require coordination among MAG members and possibly modification to local regulations.

Funding allocation will need to be addressed as a line item in any future revenue program. Ideally, right-of-way preservation and scalloped streets

mitigation would have a dedicated source of funding that could be accessed when a critical regional need arises (similar to the funding for the Red Letter process in the Regional Area Road Fund program.) The amount proposed in this report is \$75 million for each of the three time periods.

Arterial grid expansion is intended to be more of a prioritization process within the implementation program that would offer higher ranking to projects that help close regional arterial gaps or mitigate regional arterial deficiencies.